Reprinted by permission from Linguistics 60:33-48 (August 1970). Sections 1, 2, 5, 6, and 7 only of this article have been reproduced, as they bear on the second article in this volume, "A Fourth Analysis of Baruya Consonants", by Joy Lloyd.

BARUA PHONEMES: A PROBLEM IN INTERPRETATION

J. LLOYD AND A. HEALEY

1. INTRODUCTION

The analysis of Barua[1] phonology presents two main problems. Contoid clusters of four phones occur, with few heterorganic clusters as a precedent on which to base their interpretation.[2] There is interdependence between the allocation of medial allophones and the interpretation of medial contoid sequences, giving rise to several possible consonant analyses. These are presented in Section 7.

The description of Barua is based on the emic syllable which consists of a nucleus of one or two vowels, an optional onset of consonant, semivowel, or consonant plus semivowel, and an optional consonant as closure. Thus Barua syllables may be represented by the general formula: (C) (S) V (V) (C).

2. CONSONANTS

The fourteen consonant and semivowel phonemes are shown in Chart 1. Some of their contrasts may be illustrated as follows:[3]

[1] The Barua dialect of the Barua-Wantakia language is spoken by about 2,400 people living south of Wonenara Patrol Post in the Eastern Highlands District of the Territory of New Guinea. The materials for this paper were collected monolingually during a period of 42 months' field time, between January 1961 and July 1967, from speakers of the Barua dialect living within five miles south of Wonenara. The data was collected and analysed by Joyce and Richard Lloyd under the auspices of the Summer Institute of Linguistics. The paper was edited and Sections 3 and 7 written by Alan Healey. Richard Lloyd is responsible for the Appendix.

[2] The term 'interpret' is taken from K.L. Pike, *Phonemics* (Ann Arbor, University of Michigan Press, 1947) 128-140.

[3] Symbols used in this paper are based on K.L. Pike, *Phonemics*, 5, 7. Inherent length on vowels, prenasalization on complex phonemes, and low pitch are not marked in the phonemic transcription. Phonetics are given when relevant. Pitch symbols are ´ high, ` low.

/pʌryʌ/	'claw'	/bʌryʌ/	'to die'
/taŋʌ/	'heavy'	/daŋʌ/	'pain'
/kalʌ/	'mourning fringe'	/galʌ/	'raw'
/ʌŋʌpə/	'house Obj.'	/ʌŋʌwə/	'to the house'
/yərayʌ/	'cloud'	/yəlayʌ/	'affection'
/nɛno/	'I ate'	/neŋo/	'old women'

The glottal stop has these word-medial allophones: [ʔ] before vowels or semivowels;[4] unreleased stops [p], [t], and [k] before homorganic stops and nasals.

/wʌyʌʔélo/	[wɔ̀yʌ̀ʔé:lɔ̀:]	(boy's name)
/wʌʔwayʌ/	[wɔ̀ʔwà:yʌ̀]	'a wound'
/dʌʔpəʔko/	[ⁿdʌ̀p:ʊ̀k:ɔ̀:]	'Let them cut!'
/ʌʔmwɛ́/	[ʌ̀pmwɛ́:]	'person'

The voiceless stops /p/, /t/ and /k/ have the following syllable-initial allophones: fortis voiceless stop in word-initial position or following /ʔ/, and voiced fricative following vowels.

/dʌʔpəʔko/	[ⁿdʌ̀p:ʊ̀k:ɔ̀:]	'Let them cut!'
/dʌpʌno/	[ⁿdʌ̀ɓʌ̀nɔ̀:]	'here'

CHART 1

Barua Phonemes

CONSONANTS	Labial	Dental	Alveolar	Backed Velar	Glottal
Voiceless stops	p	t		k	ʔ
Prenasalized Voiced Stops	b	d		g	
Nasals	m	n		ŋ	
Flap			r		
Lateral			l		
SEMIVOWELS	w		y		
VOWELS	Front	Central	Back		
High	i	ə	u		
Mid	ɛ	ʌ	o		
Low		a			
PITCH-ACCENT	´				

[4] [ʔ] has been found to occur in only four words.

/ʌʔtʌ/	[ʌ̀t:ʌ̀]	'hand'
/yətʌ́/	[yə̀ʟ́ʌ́]	'Look!' (exclamation)
/tʌʔkʌ/	[tʌ̀k:ʌ̀]	'armband'
/yəkulʌ́/	[yə̀gùlʌ́]	(ant species)

The voiced stops /b/, /d/, and /g/ have the following syllable-initial allophones: [mb], [nd], and [ŋg] following vowels, and [ᵐb], [ⁿd], and [ᵑg] following /ʔ/ and homorganic nasals. [n̪d̪] occurs following /i/.[5]

/tyambyʌ́/	[tšà:m:byʌ́]	'shield'
/ʌʔbʌno/	[ʌ̀pᵐbʌ̀nò:]	'above'
/ʌndərəʔtʌ/	[ʌ̀n:də̀ř:ə̀t:ʌ̀]	'beside house'
/ʌʔdʌkálʌ/	[ʌ̀tⁿdʌ̀gá:lʌ̀]	'elbow'
/ʌʔgʌnánnʌ/	[ʌ̀kᵑgʌ́nán:ʌ̀]	'finger'
/lidaləʔtʌ/	[lìn̪:d̪à:lə̀t:ʌ̀]	(grass species)

The phoneme /r/ has the following word-medial syllable-initial allophones: [l̀] before /i/ or /y/ and [ř] elsewhere.

/puriʔnyʌ/	[pùl̀itnyʌ̀]	'a joke'

The allophones of /y/ are: [y] in syllable-initial position or following consonants other than /t/ and /d/; [š] following /t/ and [ž] following /d/, except that /ty/ and /dy/ after vowels are [ž] and [nž] respectively.

/tyuyʌ́/	[tšùyʌ́]	'tail'
/dətyəlo/	[də̀žùlò:]	'Say! (you all)'

The allophones of /n/ are: dental [n] in all positions where nasals occur, except following /i/ where interdental [n̪:] occurs.[5]

/pwʌinʌ/	[pwə̀in:ʌ̀]	'one Masc.'

CHART 4

Medial Consonant Clusters

ʔp	ʔt	ʔk
ʔb	ʔd	ʔg
ʔm	ʔn	
mm	nn	
mb	nd	ŋg

5. CLUSTERS

The interpretation of contoid clusters poses a problem since few heterorganic clusters occur on which to base their interpretation. The heterorganic clusters which do occur are used mainly by the older generation. Most speakers use a homorganic cluster instead in each case. Heterorganic clusters may have been common at one time as they occur in most other Anga languages (see Appendix).

Morphophonemically the first consonant of a cluster assimilates to the point of articulation of the second.

/kəmnʌ/	/kənnʌ/	'sugar cane'
/taləptʌ/	/taləʔtʌ/	'tongue'[7]

However, most homorganic clusters occur only in word-medial position and are presented as sequences of phonemes in this analysis. These are listed on Chart 4. On the other hand [ᵐb], [ⁿd], and [ᵑg] were interpreted as complex units /b/, /d/, and /g/ because they occur in word-initial position where only single consonants occur. Medial [mb], [nd], and [ŋg] were also interpreted as complex units, allowing them to be allophones of /b/, /d/, and /g/.

Similarly, there is a lack of suitable consonant clusters or vowel clusters as a basis for interpreting non-syllabic [y] and [w] following contoids. Nevertheless, in this analysis they have been interpreted as semivowels /y/ and /w/,[8] rather than as part of a vowel glide or as part of a palatalized or labialized consonant. This interpretation results in many con-

[7] Sequences of /ʔ/ plus a nasal or stop are all phonetically homorganic.

[8] When following consonants, [w] and [y] were interpreted as /w/ and /y/ to agree with /w/ and /y/ in syllable-initial position where only consonants and semivowels occur. To interpret [w] and [y] following consonants as /u/ and /i/ would result in morphophonemic changes when stems beginning with /w/ and /y/ have consonant prefixes. Note also that [š] and [ž] are more reasonably viewed as allophones of /y/ than of /i/.

sonant-semivowel clusters, since /y/ occurs following any consonant or consonant cluster,[9] and /w/ following all but dentals and alveolars. These are listed in Chart 5.

CHART 5

Consonant-Semivowel Clusters

Initial and Medial	pw	py	ty	kw	ky
	bw	by	dy	gw	gy
	mw	my	ny		
Medial only			ry	ʔw	ʔy
			ly	ŋw	ŋy
	ʔpw	ʔpy	ʔty	ʔkw	ʔky
	ʔbw	ʔby	ʔdy	ʔgw	ʔgy
	ʔmw	ʔmy	ʔny		
	mmw	mmy	nny		
	mbw	mby	ndy	ŋgw	ŋgy

The two kinds of cluster interpretation mentioned above have been adopted for several reasons:

(a) There are a large number of different sequences and they occur more frequently than single phonemes.

(b) If all such sequences were interpreted as phonetically complex phonemes to conform to the non-suspect V and CV syllable patterns a total of 67 consonants and semivowels would result. It seems preferable to set up the additional syllable patterns VC, CVC, CSV and CSVC instead.

(c) The patterns of contoid and non-syllabic high vocoid sequences are complex, but also quite symmetrical.

(d) All the segments contained within these sequences also occur in other contexts as single phonemes.

(e) For each of the clusters posited there are some words in which the phonemes of the cluster are separated by a morpheme boundary. However this is also true of medial /b/, /d/ and /g/.

/baʔnʌ/	*ba-ʔ-nʌ*	'Why?'
	what-purpose-concerning	
/kɛʔbʌno/	*kɛ-ʔ-bʌno*	'up there'
	there-up-place	

[9] /ty, /dy/, and /ry/ are phonetically [z], [nz], and [l̥y] respectively. [l̥y] is always unaccented.

/kɛmbʌno/	*kɛ-m-bʌno* there-along-place	'along there'
/nyayʌ́/	*n-yayʌ* my-parent in law	'my parent in law'
/bwanəmo/	*b-wan-əmo* come-go ahead-let me	'Let me pass'.

Non-syllabic [y] when it occurs following a nuclear vowel in the same syllable has been interpreted as /i/, thus establishing vowel clusters, rather than introducing post-nuclear semivowels or five glided vowel phonemes. [w] does not occur in this position.

/bʌimʌ́nəʔko/	'It is dying'.

In the few instances when non-syllabic [y] follows non-syllabic [w] in the syllable onset, [y] has been interpreted as /i/. This eliminates the necessity of introducing /wy/ sequences.

/kwiaryʌ/	(pandanus tree species)

The following vowel clusters occur in both open and closed syllables:

			ui
ɛi	*iʌ*	*ʌi*	*oi*
	ia	*ai*	

6. DISTRIBUTION

Consonant clusters of C(onsonant) C(onsonant) S(emivowel) occur in word-medial position. Since CS is the largest word-initial cluster the emic syllable break is considered to occur between the two word-medial consonants.

kwaʔ.kʌ	'ground'
tyam.byʌ	'shield'

The syllable types are as follows:

V	*a.wʌ.no*	'no'	V.SV.CV
VV	*ai.mwá.ləʔ.ko*	'Who is there?'	VV.CSV.CVC.CV
CV	*bə.rɛ*	(grass species)	CV.CV
CVV	*bʌi.mwʌʔ.ko*	'It died'	CVV.CSVC.CV
SV	*yə.mo*	'Let me work'	SV.CV

SVV	*woi.mwʌ.no*	'I filed (knife)'	SVV.CSV.CV
CSV	*dyə.té.ro*	'You will work'	CSV.CV.CV
CSVV	*tyoi.káʔ.tʌ*	(taro species)	CSVV.CVC.CV
VC	*ʌʔ.mwé.wo*	'woman'	VC.CSV.SV
VVC	*aiʔ.púʔ.mwʌʔ.ko*	'Who took grass from the roof?'	VVC.CVC.CSVC.CV
CVC	*buʔ.tʌ*	'tadpole'	CVC.CV
CVVC	*bʌiʔ.pú.rə.mo*	'Let me sharpen (knife)'	CVVC.CV.CV.CV
SVC	*wʌʔ.ká.mo*	'Let me put'	SVC.CV.CV
SVVC	*wʌiʔ.pə.rʌ.wə.mo*	'Let me tear off bark'	SVVC.CV.CV.CV.CV
CSVC	*kwaʔ.kwiʌ*	(species of ant)	CSVC.CSVV
CSVVC	*gwʌiʔ.pə.rʌ.wə.mo*	'Let me scrape off bark'	CSVVC.CV.CV.CV.CV

All syllable patterns occur in word-initial position; all those beginning with C or S occur in medial position; and open syllables beginning with C or S occur in final position. In abbreviated words, syllables closed with /ʔ/ may occur word-finally:

/ʌʔmwéwo/,	/ʌʔmwéʔ/	'woman'
/mwaləʔko/,	/mwaləʔ/	'He is sitting'

A word is the smallest unit which can be uttered in isolation and carry sentence intonation. Words of up to 16 syllables have been recorded. Monosyllabic words are rare. There are a number of two-syllable words but the majority have three or more syllables.

Any consonant or semivowel may occur in syllable-initial position except that /ŋ/, /r/, and /ʔ/ do not occur word-initially. Consonants which occur in syllable-final position are /ʔ/, /m/, /n/, and /ŋ/. Of these /ʔ/ occurs preceding /p/, /t/, /k/, /m/, and /n/; /m/ and /n/ occur preceding homorganic nasals and stops; and /ŋ/ occurs preceding /g/.

/ʌ/, /a/, and /ɛ/ may occur in word-initial position. All vowels occur in word-medial position. Stem-finally /i/, /ʌ/, /a/, and /ɛ/ occur. Utterance final words and citation forms all end in /o/, but in utterance-medial positions words end in all vowels except /o/ and /u/. /i/ occurs preceding /ʌ/ and /a/, and following all vowels except /ə/. Morphophonemically the cluster **əi* becomes /i/.

The sequences /uw/, /ow/, /wu/, /iy/, and /ɛy/ have not been observed, although /yi/, /yɛ/, and /wo/ occur.

CHART 6

Comparison of three[10] Analyses of Barua and one of Wantakia

	INITIAL		MEDIAL					
BARUA								
Phonetics	[p]	[^{m}b]	[ɓ]		[mb]	[p:]	[pm]	[m:b]	[p^{m}b]
Phonemes									
Analysis 1	p	b	p		b	ʔp	ʔm	mb	ʔb
Analysis 2	p	b	b		mp	p	ʔm	mb	ʔb
Analysis 3	p	b	b		mp	pp	pm	mb	pb
WANTAKIA									
Phonetics	[p]	[p]	[ɓ]		[ɓ]	[p:]	[ʔm]	[mp]	[p:]
Phonemics	p	p	p		p	ʔp	ʔm	mp	ʔp
BARUA									
Phonetics	[t]	[^{n}d]	[ɗ]	[ř]	[nd]	[t:]	[tn]	[n:d]	[t^{n}d]
Phonemes									
Analysis 1	t	d	t	r	d	ʔt	ʔn	nd	ʔd
Analysis 2	t	d	d	r	nt	t	ʔn	nd	ʔd
Analysis 3	t	d	d	t	nt	tt	tn	nd	td
WANTAKIA									
Phonetics	[t]	[t]	[ɗ]	[ř]	[ɗ]	[t:]	[ʔn]	[nt]	[t:]
Phonemics	t	t	t	r	t	ʔt	ʔn	nt	ʔt
BARUA									
Phonetics	[k]	[^{ŋ}g]	[ɠ]	[ʔ]	[ŋg]	[k:]		[ŋ:k]	[k^{ŋ}g]
Phonemes									
Analysis 1	k	g	k	ʔ	g	ʔk		ŋg	ʔg
Analysis 2	k	g	g	ʔ	ŋk	k		ŋg	ʔg
Analysis 3	k	g	g	k	ŋk	kk		ŋg	kg
WANTAKIA									
Phonetics	[k]	[k]	[ɠ]	[ʔ]	[ɠ]	[k:]		[ŋk]	[k:]
Phonemics	k	k	k	ʔ	k	ʔk		ʔk	ʔk

[10] In Analyses 1 and 2, /ʔ/ in /ʔC/ sequences could be interpreted as /p/, /t/, and /k/ as in Analysis 3, giving two additional alternate analyses in which /ʔ/ occurs in only four words. This interpretation of /ʔ/ as /p/, /t/, and /k/ results in an even larger number of morphophonemic rules than does Analysis 3.

7. ALTERNATE ANALYSES: CONSONANTS

The allocation of consonantal allophones and the interpretation of medial contoid clusters are interrelated as can be seen by comparing the alternate analyses presented in Chart 6. In one the short prenasalized stops, and in another the lengthened stops have been interpreted as complex units, with resulting changes in distribution of allophones. Without introducing extra phonemes it is not possible to interpret more than one set of sequences in each analysis as complex units. Analysis 3 treats all these as phoneme sequences. The unreleased stops are interpreted as allophones of /ʔ/ in Analyses 1 and 2 where /ʔ/ occurs as a phoneme, and as allophones of the voiceless stops in Analysis 3 which has no /ʔ/ phoneme.

In evaluating the alternative analyses several criteria need to be considered.

(a) Which analysis has the least number of phonemes? Analysis 3 has only ten consonants while Analyses 1 and 2 have twelve, including /r/ and /ʔ/. Counterbalancing this, Analysis 3 has sixteen consonant clusters while Analyses 1 and 2 have only thirteen.

(b) Which analysis has the best correlation between morpheme boundaries and phoneme boundaries? Analysis 3 has, since it interprets all contoid sequences as consonant clusters, whereas Analyses 1 and 2 each treat one set of contoid sequences as complex phonemes, despite the fact that these frequently contain morpheme boundaries.

(c) Which analysis results in the fewest morphophonemic rules? The morphophonemic rules under each analysis are listed in Chart 7. Analysis 2 is best in this respect, having only 6 morphophonemic rules. Analysis 1 has seven rules but Analysis 3 has ten.

(d) Which analysis best parallels the Wantakia dialect?[11] It will be noted on Chart 6 that Wantakia has no voiced stops. Analysis 1 is the only one which always parallels Barua /b/, /d/ and /g/ with Wantakia /p/, /t/ and /k/. From another point of view, Analysis 1 results in only three non-identical phoneme correspondences between Barua and Wantakia, whereas Analysis 2 has nine and Analysis 3 has ten.

(e) Which analysis has the fewest syllable patterns? In Analysis 2 the syllable patterns VVC, CVVC, SVVC and CSVVC do not occur, leaving a total of twelve. The other two analyses have sixteen syllable patterns.

(f) Which analysis has the most symmetry? If we ignore the only two

[11] The Wantakia dialect is spoken by about 1,250 people and is more divergent from Barua than the Gulecha dialect which is spoken by about 280 people. In a comparison of 500 words Barua and Wantakia shared 85% cognates.

CHART 7

Initial-Medial Allomorphic Alternation

Sounds which occur in allomorphic alternation			Treatment as allophones of one phoneme or as two separate phonemes in allomorphic alternation		
Initial		Medial	Analysis 1	Analysis 2	Analysis 3
[p]	~	[ɓ]	p	p~b	p~b
[ᵐb]	~	[ɓ]	b~p	b	b
[t]	~	[ɾ]	t~r	t~r	t
[ⁿd]	~	[ɗ]	d~t	d	d
[k]	~	[ɠ]	k	k~g	k~g
[ᵑg]	~	[ɠ]	g~k	g	g
Inter-vocalic		Preceding nasal or stop			
[w]	~	[p]	w~ʔ	w~ʔ	w~p
[w]	~	[t]	w~ʔ	w~ʔ	w~t
[w]	~	[k]	w~ʔ	w~ʔ	w~k
[ɓ]	~	[p]	p~ʔ	b~ʔ	b~p
[ɓ]	~	[t]	p~ʔ	b~ʔ	b~t
[ɓ]	~	[k]	p~ʔ	b~ʔ	b~k
[ɾ]	~	[p]	r~ʔ	r~ʔ	t~p
[ɾ]	~	[t]	r~ʔ	r~ʔ	t
[ɾ]	~	[k]	r~ʔ	r~ʔ	t~k
			7 rules	6 rules	10 rules

reliable instances of medial glottal, /wʌʔwayʌ́/ 'a wound' and /waʔwayʌ/ (bird species), then we may say that

Analysis 1 lacks medial /mp/ /ŋk/ /ʔŋ/
Analysis 2 lacks medial /ʔp/ /ʔk/ /ʔŋ/
Analysis 3 lacks medial /p/ /k/ /kŋ/

and so all three have comparable assymetry thus far. In the dentals however,

Analysis 1 lacks medial /nt/ and includes unparalleled phoneme /r/
Analysis 2 lacks medial /ʔt/ and includes unparalleled phoneme /r/
Analysis 3 is fully symmetrical

and therefore is best in this respect.

Taking these six criteria together it seems that the three analyses equal in advantages and disadvantages. The choice of Analysis 1 for the description in Sections 1-6 is linguistically arbitrary.[18]

[18] However, a preference for Analysis 1 seems to be indicated by the reactions of Barua people to literacy instruction using several experimental othographies based on the alternative analyses discussed here.

LANGUAGE DATA

Asian-Pacific Series No. 12

(Also published as Language Data Microfiche AP 12)

ANGAN LANGUAGES ARE DIFFERENT

FOUR PHONOLOGIES

Edited by

Phyllis M. Healey

Summer Institute of Linguistics
Huntington Beach, California 92648

Copyright © 1981 by the
Summer Institute of Linguistics
Ukarumpa, E.H.P., Papua New Guinea